

SAFETY DATA SHEET

1. SUBSTANCE AND SOURCE IDENTIFICATION

Product Identifier

SRM Number: 1597a
SRM Name: Complex Mixture of Polycyclic Aromatic Hydrocarbons from Coal Tar
Other Means of Identification: Not applicable.

Recommended Use of This Material and Restrictions of Use

This Standard Reference Material (SRM) is intended for use in the evaluation and validation of analytical methods for the determination of a natural, combustion-related mixture of polycyclic aromatic hydrocarbons (PAHs). SRM 1597a is isolated from a coal tar sample and dissolved in toluene. A unit of SRM 1597a consists of one five-milliliter ampoule, containing 1.3 mL of material.

Company Information

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2. HAZARDS IDENTIFICATION

Classification

Physical Hazard:	Flammable Liquid	Category 2
Health Hazard:	Acute Toxicity, Inhalation	Category 4
	Skin Corrosion/Irritation	Category 2
	Serious Eye Damage/Irritation	Category 2B
	Carcinogenicity	Category 2
	Reproductive Toxicity	Category 2
	STOT, Single Exposure	Category 3
	STOT, Repeated Exposure	Category 2
	Aspiration Hazard	Category 1

Label Elements

Symbol



Signal Word

DANGER

Hazard Statement(s)

H225	Highly flammable liquid and vapor.
H304	May be fatal if swallowed and enters airways.
H315+H320	Causes skin and eye irritation.
H332	Harmful if inhaled.
H336	May cause drowsiness or dizziness.
H351	Suspected of causing cancer (inhalation).
H361	Suspected of damaging fertility or the unborn child.
H373	May cause damage to organs (eyes, skin, respiratory system, central nervous system, liver, kidneys) through prolonged or repeated exposure (inhalation, ingestion, skin contact).

Precautionary Statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat, sparks, open flames, and hot surfaces. No smoking.
P241	Use explosion-proof electrical, ventilating, and lighting equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P260	Do not breathe fumes, gas, mist, vapors, or spray.
P264	Wash hands thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves, protective clothing and eye protection.
P301+P310+P331	If swallowed: Immediately call a doctor. Do NOT induce vomiting.
P303+P361+P353	If on skin (or hair): Remove immediately all contaminated clothing. Rinse skin with water.
P304+P340	If inhaled: Remove victim to fresh air and keep comfortable for breathing.
P305+P351+P338	If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308+P313	If exposed or concerned: Get medical attention.
P362+P364	Take off contaminated clothing and wash it before reuse.
P403+P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents and container according to local regulations.

Hazards Not Otherwise Classified: Not applicable.

Ingredients(s) with Unknown Acute Toxicity: Not applicable.

3. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

Substance: PAHs from coal tar in toluene

Other Designations: Toluene (methylbenzene; toluol; 1-methylbenzene; methylbenzol; phenylmethane)
Naphthalene (Tar camphor; white tar; naphthene; camphor tar)

This material, a mixture of toluene containing a small amount of naphthalene and trace amounts of other PAHs has not been tested as a whole. Though many of the PAHs have been reported to have mutagenic and/or carcinogenic properties, the trace amounts found in this SRM do not require individual SDS information under OSHA 29 CFR 1910.1200. For other PAH concentrations, see the Certificate of Analysis.

Hazardous Component(s)	CAS Number	EC Number (EINECS)	Nominal Mass Concentration (%)
Toluene	108-88-3	203-625-9	99
Naphthalene	91-20-3	202-049-5	0.1

4. FIRST AID MEASURES

Description of First Aid Measures:

Inhalation: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Seek immediate medical attention.

Skin Contact: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get immediate medical attention, if needed. Thoroughly clean and dry contaminated clothing before reuse.

Eye Contact: Immediately flush eyes, including under the eyelids with copious amounts of water for at least 15 minutes. Seek immediate medical attention.

Ingestion: Aspiration hazard! **Do not** induce vomiting. If vomiting occurs, keep head lower than hips to help prevent aspiration. Get immediate medical attention. Give artificial respiration if not breathing.

Most Important Symptoms/Effects, Acute and Delayed: Respiratory tract, skin, and eye irritation; aspiration hazard, nervous system depression, and nerve damage.

Indication of any immediate medical attention and special treatment needed, if necessary: If any of the above symptoms are present, seek immediate medical attention.

5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Severe fire hazard. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Vapor/air mixtures are explosive. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion. See Section 9, "Physical and Chemical Properties" for flammability properties.

Extinguishing Media:

Suitable: Regular dry chemical, carbon dioxide, water spray, regular foam.

Unsuitable: None listed.

Specific Hazards Arising from the Chemical: Thermal decomposition products: oxides of carbon, hydrocarbons.

Special Protective Equipment and Precautions for Fire-Fighters: Avoid inhalation of material or combustion byproducts. Wear full protective clothing and NIOSH approved self-contained breathing apparatus (SCBA).

NFPA Ratings (0 = Minimal; 1 = Slight; 2 = Moderate; 3 = Serious; 4 = Severe)

Health = 2

Fire = 3

Reactivity = 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures: Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk. Immediately contact emergency personnel. Isolate hazard area, and deny entry. Reduce vapors with water spray. Use suitable protective equipment; see Section 8, "Exposure Controls and Personal Protection".

Methods and Materials for Containment and Clean up: Do not touch spilled material. Notify safety personnel of spills. Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Avoid and remove sources of ignition. Keep out of water supplies and sewers.

7. HANDLING AND STORAGE

Safe Handling Precautions: Open glass ampoules carefully to prevent contamination and injury. See Section 8, "Exposure Controls and Personal Protection".

Storage: Store and handle in accordance with all current regulations and standards. Keep separated from incompatible substances (see Section 10, "Stability and Reactivity"). Sealed ampoules, as received, should be stored as indicated in the NIST Certificate of Analysis.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits			
Component(s)	NIOSH (REL)	ACGIH (TLV)	OSHA (PEL)
Toluene	TWA: 375 mg/m ³ ; 100 ppm STEL: 560 mg/m ³ ; 150 ppm IDLH: 1885 mg/m ³ ; 500 ppm	TWA: 75 mg/m ³ ; 20 ppm	TWA: 750 mg/m ³ ; 200 ppm Ceiling: 1120 mg/m ³ ; 300 ppm (10 min)
Naphthalene	TWA: 50 mg/m ³ ; 10 ppm STEL: 75 mg/m ³ ; 15 ppm IDLH: 1250 mg/m ³ ; 250 ppm	TWA: 50 mg/m ³ ; 10 ppm Skin - potential significant contribution to overall exposure by the cutaneous route.	TWA: 50 mg/m ³ ; 10 ppm

Engineering Controls: Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

Personal Protection: In accordance with OSHA 29 CFR 1910.132, subpart I, wear appropriate Personal Protective Equipment (PPE) to minimize exposure to this material.

Respiratory Protection: If workplace conditions warrant a respirator, a respiratory protection program that meets OSHA 29CFR 1910.134 must be followed. Refer to NIOSH 42 CFR 84 for applicable certified respirators.

Eye/Face Protection: Wear splash resistant safety goggles with a face shield. An eyewash station should be readily available near areas of use.

Skin and Body Protection: Chemical-resistant gloves should be worn at all times when handling chemicals.

9. PHYSICAL AND CHEMICAL PROPERTIES

Descriptive Properties	Toluene (99 % of this SRM)	Naphthalene (0.1 % of this SRM)
Appearance (physical state, color, etc.)	clear, colorless liquid	white solid
Molecular Formula	C ₇ H ₈	C ₁₀ H ₈
Molar Mass (g/mol)	92.14	128.16
Odor	distinct odor	mothball odor
Odor threshold (ppm)	10 to 15	0.003
pH	not available	not available
Evaporation rate (butyl acetate = 1)	2.24	<1
Melting point/freezing point (°C)	−95 (−139 °F)	80 (−139 °F)
Sublimation Point	not applicable	>80 (>−139 °F)
Density	not available	1.162 g/mL @ 20 °C
Relative Density as specific gravity (water = 1)	0.8669	not available
Vapor Pressure	22 mmHg at 20 °C	0.05 mmHg at 20 °C
Vapor Density (air = 1)	3.14	4.4
Viscosity (cP)	0.560 cP at 25 °C	not available
Solubility(ies)	water solubility: 0.05 % at 20 °C; soluble in alcohol, ether, benzene, chloroform, ligroin, acetic acid, carbon disulfide, acetone	insoluble in water at 20 °C; soluble in benzene, carbon tetrachloride, acetone, dimethyl sulfoxide, 95 % ethanol, methanol, toluene, ether, chloroform, olive oil, turpentine, carbon disulfide, dichloroethane, organic solvents, petroleum ether, hydronaphthalenes
Partition coefficient	log Kow = 2.73 (n-octanol/water)	3.6 (water/oil)
Thermal Stability Properties		
Autoignition Temperature (°C)	480 (896 °F)	526 (979 °F)
Thermal Decomposition (°C)	not applicable	not applicable
Initial boiling point and boiling range (°C)	111 (232 °F)	218 (424 °F)
Explosive Limits, LEL (Volume %)	1.2	0.9
Explosive Limits, UEL (Volume %)	7.1	5.9
Flash Point (°C)	4 (39.2 °F) CC	79 (174 °F) OC
Flammability (solid, gas)	not applicable	not applicable

10. STABILITY AND REACTIVITY

Reactivity: Stable at normal temperatures and pressure.

Stability: X Stable Unstable

Possible Hazardous Reactions: No data available.

Conditions to Avoid: Avoid heat, flames, sparks and other sources of ignition. Ampoules may rupture or explode if exposed to heat. Keep out of water supplies and sewers.

Incompatible Materials: Oxidizing materials, halogens, combustible materials, acids, metal salts.

Fire/Explosion Information: See Section 5, “Fire Fighting Measures”.

Hazardous Decomposition: Thermal decomposition will produce oxides of carbon, hydrocarbons.

Hazardous Polymerization: _____ Will Occur X Will Not Occur

11. TOXICOLOGICAL INFORMATION

Route of Exposure: X Inhalation X Skin X Ingestion

Symptoms Related to the Physical, Chemical and Toxicological Characteristics: Respiratory tract, skin, and eye irritation; aspiration hazard, nervous system depression, and nerve damage.

Potential Health Effects (Acute, Chronic and Delayed):

Inhalation: Exposure up to 100 ppm toluene may cause irritation; levels of 200 ppm to 600 ppm for up to 8 h caused fatigue, weakness, confusion, headache, nausea, impaired coordination and reaction time, paresthesia of the skin, euphoria, dizziness, and dilated pupils; levels up to 800 ppm caused rapid irritation, nasal mucous secretion, metallic taste, drowsiness, and impaired balance. After effects including nervousness, muscular fatigue, and insomnia lasted for several days. Inhalation of naphthalene vapors may cause respiratory tract irritation, headache, nausea, vomiting, abdominal cramps, diarrhea, edema, perspiration, confusion, excitement, and cancer.

Skin Contact: Contact with toluene may cause irritation and dermatitis due to defatting. Repeated or prolonged skin contact with naphthalene may produce a dermatitis characterized by itching, redness, scaling, weeping, and crusting of the skin.

Eye Contact: Irritation with redness and pain and conjunctivitis.

Ingestion: Aspiration hazard; ingestion of toluene can cause lung damage and death.

Numerical Measures of Toxicity:

Acute Toxicity: Category 4, Inhalation
Toluene: Rat, Oral LD50: 5.5 to 7.5 g/kg
Rat, Dermal LD50: 8390 mg/kg
Rat, Inhalation LC50: 12.5 mg/L (4 h)
Naphthalene: Rat, Oral LD50: 490 mg/kg
Rat, Dermal LD50: 1120 mg/kg
Rat, Inhalation LC50: >340 mg/L (1 h)

Skin Corrosion/Irritation: Category 2
Toluene: Rabbit, Dermal: 435 mg (mild); 500 mg (moderate); 20 mg (moderate, 24 h)
Naphthalene: Rabbit, Dermal: 495 mg (open skin, mild); 0.05 mL (severe, 24 h)

Serious Eye Damage/Eye Irritation: Category 2B
Toluene: Rabbit, Eye: 870 µg (mild); 100 mg/30 s rinse (mild); 2 mg (severe, 24 h)
Naphthalene: Rabbit, Eye: No data available.

Respiratory Sensitization: No data available.

Skin Sensitization: No data available.

Germ Cell Mutagenicity: Not classified.
Toluene: Human, Inhalation: 252 µg/L (19 years)
Naphthalene: No data available.

Carcinogenicity: Category 2B

Listed as a Carcinogen/Potential Carcinogen X Yes _____ No

Toluene is not listed by NTP or OSHA as a carcinogen/potential carcinogen; IARC lists toluene as Group 3, *not classifiable*.

Naphthalene is listed by IARC as Group 2B, *possibly carcinogenic to humans* and by NTP as *reasonably anticipated to be a human carcinogen*.

Reproductive Toxicity: Category 2B

Toluene: Endpoints listed for reproductive effects on embryo or fetus
Rat, Oral, TDLo: 7280 mg/kg (pregnant 6 d to 19 d),
fetotoxicity (except death, e.g., stunted fetus)
Mouse, Oral, TDLo: 9 g/kg (pregnant 6 d to 15 d), fetal death
Naphthalene: Endpoints listed for reproductive effects
Rat, Oral, TDLo: 4500 mg/kg (pregnant 6 d to 15 d)
Mouse, Oral, TDLo: 2400 mg/kg (pregnant 7 d to 14 d)

Specific Target Organ Toxicity, Single Exposure: Category 3 (narcotic effects)

See health effects listed in "Potential Health Effects (Acute, Chronic and Delayed)".

Specific Target Organ Toxicity, Repeated Exposure: Category 2

Prolonged or repeated exposure to toluene may cause mucous membrane irritation, vomiting, insomnia, nosebleeds, chest pains, euphoria, headache, vertigo, nausea, anorexia, momentary loss of memory, loss of coordination and impairment of reaction time, tinnitus, impaired speech, vision, and/or hearing, alcohol intolerance, and petechiae and abnormal bleeding. Volunteers exposed to 200 ppm for 6 h per day for 2 d showed a significant increase in heart rate. Cardiac sensitization may occur and may result in cardiac arrest due to ventricular fibrillation. Repeated inhalation to the point of euphoria has caused irreversible encephalopathy with cerebellar ataxia, rhythmic limb movements, disequilibrium, bizarre behavior, emotional lability, optic atrophy, and diffuse cerebral atrophy.

Aspiration Hazard: Category 1; toluene is reported as an aspiration hazard.

12. ECOLOGICAL INFORMATION

Ecotoxicity Data:

Toluene:

Fish Toxicity: Rainbow trout (*Oncorhynchus mykiss*) LC50 (flow-through): 5.9 mg/L to 7.8 mg/L (96 h)

Invertebrate: Freshwater water flea (*Daphnia magna*) EC50 (static): 5.5 mg/L to 9.8 mg/L (48 h)

Naphthalene:

Fish Toxicity: Rainbow trout (*Oncorhynchus mykiss*) LC50 (static): 0.91 mg/L to 2.82 mg/L (96 h)

Invertebrate: Freshwater water flea (*Daphnia magna*) EC50 (static): 2.16 mg/L (48 h)

Persistence and Degradability: No data available.

Bioaccumulative Potential: Toluene: BCF 18.66; Naphthalene: BCF 323.59

Mobility in Soil: No data available

Other Adverse effects: No data available.

13. DISPOSAL CONSIDERATIONS

Waste Disposal: Dispose of waste in accordance with all applicable federal, state, and local regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262, Hazardous Waste Number: U220 (Toluene) and U165 (naphthalene).

14. TRANSPORTATION INFORMATION

U.S. DOT and IATA: UN1294, Toluene, Hazard Class 3, Packing Group II, Excepted Quantities E2.

15. REGULATORY INFORMATION

U.S. Regulations:

CERCLA Sections 102a/103 (40 CFR 302.4) Toluene: 5000 lbs (2270 kg) final RQ
Naphthalene: 100 lbs (45.4 kg) final RQ

SARA Title III Section 302 (40 CFR 355.30): Not regulated.

SARA Title III Section 304 (40 CFR 355.40): Not regulated.

SARA Title III Section 313 (40 CFR 372.65): Toluene: 1.0 % de minimis concentration
Naphthalene: 0.1 % de minimis concentration

OSHA Process Safety (29 CFR 1910.119): Not regulated.

SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21):

ACUTE HEALTH:	Yes.
CHRONIC HEALTH:	Yes.
FIRE:	Yes.
REACTIVE:	No.
PRESSURE:	No.

State Regulations:

California Proposition 65: WARNING! This product contains a chemical known to the state of California to cause cancer (naphthalene) and reproductive/developmental effects (toluene).

U.S. TSCA Inventory: Toluene and naphthalene are listed.

TSCA 12(b), Export Notification: Not listed.

Canadian Regulations:

WHMIS Information: Not provided for this material.

16. OTHER INFORMATION

Issue Date: 06 November 2014

Sources: ChemAdvisor, Inc., SDS *Toluene*, 19 June 2014.

ChemAdvisor, Inc., SDS *Naphthalene*, 19 June 2014.

Hazardous Substances Data Bank, National Library of Medicine, *Toluene CAS 108-88-3*, Full Record, available at <http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB> (accessed Nov 2014).

NIOSH Pocket Guide to Chemical Hazards, U.S. Department of Health and Human Services (DHHS), *Toluene CAS 108-88-3*, (04 April 2011), available at <http://www.cdc.gov/niosh/npg/npgd0619.html> (accessed Nov 2014); also see *RTECS#*: XS5250000, (May 2009); at <http://www.cdc.gov/niosh-rtecs/XS501BD0.html> (accessed Nov 2014).

Agency for Toxic Substances and Disease Registry (ATSDR), DHHS; *Toluene*, available at <http://www.atsdr.cdc.gov/toxprofiles/tp56-c2.pdf> (accessed Nov 2014).

Key of Acronyms:

ACGIH	American Conference of Governmental Industrial Hygienists	NRC	Nuclear Regulatory Commission
ALI	Annual Limit on Intake	NTP	National Toxicology Program
CAS	Chemical Abstracts Service	OSHA	Occupational Safety and Health Administration
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	PEL	Permissible Exposure Limit
CFR	Code of Federal Regulations	RCRA	Resource Conservation and Recovery Act
DOT	Department of Transportation	REL	Recommended Exposure Limit
EC50	Effective Concentration, 50 %	RM	Reference Material
EINECS	European Inventory of Existing Commercial Chemical Substances	RQ	Reportable Quantity
EPCRA	Emergency Planning and Community Right-to-Know Act	RTECS	Registry of Toxic Effects of Chemical Substances
IARC	International Agency for Research on Cancer	SARA	Superfund Amendments and Reauthorization Act
IATA	International Air Transportation Agency	SCBA	Self-Contained Breathing Apparatus
IDLH	Immediately Dangerous to Life and Health	SRM	Standard Reference Material
LC50	Lethal Concentration, 50 %	STEL	Short Term Exposure Limit
LD50	Lethal Dose, 50 %	TLV	Threshold Limit Value
LEL	Lower Explosive Limit	TPQ	Threshold Planning Quantity
MSDS	Material Safety Data Sheet	TSCA	Toxic Substances Control Act
NFPA	National Fire Protection Association	TWA	Time Weighted Average
NIOSH	National Institute for Occupational Safety and Health	UEL	Upper Explosive Limit
NIST	National Institute of Standards and Technology	WHMIS	Workplace Hazardous Materials Information System
n.o.s.	Not Otherwise Specified		

Disclaimer: Physical and chemical data contained in this SDS are provided only for use in assessing the hazardous nature of the material. The SDS was prepared carefully, using current references; however, NIST does not certify the data in the SDS. The certified values for this material are given in the NIST Certificate of Analysis.

Users of this SRM should ensure that the SDS in their possession is current. This can be accomplished by contacting the SRM Program: telephone (301) 975-2200; fax (301) 948-3730; e-mail srmmsds@nist.gov; or via the Internet at <http://www.nist.gov/srm>.